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**Centre 6A – Patterning & Algebra   
 Problems/Challenges**

**BIG IDEAS:**

* A group of items form a pattern only if there is an element of repetition, or regularity, that can be described with a pattern rule.
* Many number, geometry, and measurement ideas are based on patterns.

1. A pattern is built by adding pairs of terms to get the next term. There is a 10 somewhere between the fourth term and the tenth term. What could the pattern be? Think of as many possibilities as you can.
2. On a 100 chart, you colour squares to form a capital letter. If you add the numbers the letter covers, the sum is between 100 and 120.

*What could the letter be? Where could it be?*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |

1. Choose a criterion from this list to create a pattern:

* Use three different shapes to create a decreasing pattern.
* Create an increasing pattern with a tenth term of 52.
* Create a pattern that grows, but not by the same amount each time.
* Create a decreasing pattern with a fifth term of 32.

Reflect after you create your pattern:

*Could you have created a different pattern? How do you know?*

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**Centre 6B – Patterning & Algebra   
 Problems/Challenges**

**BIG IDEAS:**

* Any pattern, algebraic expression, relationship, or equation can be represented in many ways.
* Arranging information in charts and tables can make patterns easier to see.

1. Investigate the surface area of towers made from a single column of connecting cubes, and predict the surface area of a tower that is 50 cubes high. Explain your reasoning.
2. Draw pictures that might help someone predict the next four terms of one of these patterns:
3. 1, 4, 9, 16,...
4. 1, 3, 6, 10,...
5. 2, 5, 8,...
6. A number pattern can be described by a table of values. The first number tells the position of the number in the pattern, and the second number is the pattern value.

For example, the pattern 2, 4, 6, 8... is described by:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 |
| 2 | 4 | 6 | 8 | 10 | 12 |

Then the table of values can be graphed; the x-coordinate is the position number and the y-coordinate is the term value.

Suppose the graph for a pattern goes through (2,3).

What could the pattern be?

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**Centre 6C – Patterning & Algebra   
 Problems/Challenges**

**BIG IDEA:**

* Patterns are all around us in the everyday world.

1. Sketch a graph to represent the relationship between the amount of cereal in a bowl and time, if you start eating slowly and then speed up in order to get to school on time.
2. *How does the graph show when the person is eating slowly? Faster?*
3. *Why is a graph a good way to show what happened?*
4. If Ms. Teschow had a good night’s sleep, and the winds are favourable, Ms. Teschow bikes to work smoothly and fairly quickly.
5. *Create a table of values and graph the relationship between distance and time for a bike travelling at a constant speed of 40 km/h.*
6. *If Ms. Teschow biked at that speed, how far would she travel in 3.5 hours?*
7. *What if Ms. Teschow decided to get on her bike, head west right now, and bike for about 9.5 hours, where might she end up? (Assuming she manages to bike at the same constant speed from part a!)*
8. Some students at Applewood Secondary School are planning to run a window cleaning business in the neighbourhood for the summer. They want to charge a $5 flat fee plus $3 per window to wash windows.

***Option 1****:**How much more would someone pay to have 35 windows washed than 24 windows?*

***Option 2****: Might someone have to pay exactly $87 to have their   
windows washed? Explain.*

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**Centre 6D – Patterning & Algebra   
 Problems/Challenges**

**BIG IDEA:**

* Variables can be used to describe mathematical relationships.

1. If *s* = 4 and *t* = 5, these statements are true:

3(s + t) = 27 2s + 3t = 23 2t – 2s = 2

1. *Choose values for p and q. Write three true statements  
   using those variables.*
2. *See if a partner can figure out what your values are.*
3. Copies of three different shapes are placed in a grid. Each shape is worth a different amount. The total amounts for one of the rows and one of the columns are given.

*How much might each shape be worth?*

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1. An expression involving the variable k has the value 10 when k = 4.
2. *What could the expression be?*
3. *What equations might you write to help solve these problems?*



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**Centre 6CD – Patterning & Algebra   
 Problems/Challenges**

**BIG IDEAS:**

* Variables can be used to describe mathematical relationships.
* Patterns are all around us in the everyday world.

1. Ms. Teschow’s homeroom class was planning a party to celebrate Ms. Teschow’s birthday. They bought some board games, pizzas, and helium-filled balloons. The games cost $15 each, the pizzas cost $10 each, and the balloons cost $5 each. The class spent a total of $100.
2. *Write an equation to represent this situation.*
3. *How many board games, pizzas, and balloons might they have bought?*
4. There were 42 singers in the TRMS Grade 7 Choir. During the holiday concert, when the Dance Club joined them for a performance, there were 77 performers in total on stage.

*Which equation below would be best to use to represent this event? Explain how you decided.*

a) 77 = 42 - *n* c) 77 + 42 = *n*

b) 77 = 42 + *n* d) 77 + *n* = 42

1. You had $100 in your bank account and put in $10.50 more each week. How long would it take to have $200 in the bank?
2. Mathurshan had ½ as much money as his sister. But he got $30 for his birthday, and now he has 2/3 as much as his sister.

*How much does his sister have?*